Experiments on proton- and α- induced reactions of particular relevance for the p process *

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Most nuclei heavier than iron are synthesized by the s and r processes via neutron-capture reactions [1]. 35 proton-rich nuclei are bypassed by these processes. These nuclei, referred to as p nuclei, are believed to be synthesized by the p process in the explosive scenario of supernovae type II [2]. At this astrophysical site, the p nuclei can be produced by a sequence of photodisintegration reactions, i.e. (γ,n), (γ,p), and (γ,α) reactions. In total, the p process involves an extensive reaction network consisting of about twenty thousand reactions on approximately two thousand nuclei. Due to the absence of experimental data, network calculations for the p process are based almost completely on theoretically predicted reaction rates stemming from Hauser-Feshbach statistical model calculations. The accuracy of these predictions depends on the adopted nuclear models for optical-model potentials, photon-strength functions and nuclear level densities. Comprehensive experimental data for astrophysically relevant reactions are mandatory to derive reliable global nuclear models for the reaction codes, but so far the experimental data base is not sufficient for this purpose.

The 10 MV ion Tandem accelerator of the University of Cologne provides unique opportunities to improve the experimental situation for proton- and α- induced reactions of relevance for the p process. This facility allows to perform both in-beam experiments using the highly-efficient HPGe detector array HORUS and activation experiments using a low-background counting setup which employs two large-volume HPGe Clover detectors. In addition, a new 6 MV Tandem accelerator for Accelerator Mass Spectrometry (AMS) [3] is currently being commissioned at the University of Cologne which can be used to detect smallest amounts of long-lived radionuclides being produced either by cosmic events or in the laboratory.

The combination of this variety of experimental approaches gives access to a large number of astrophysically relevant reactions and allows detailed investigations of some key reactions within the p-process network [4,5], which so far could not be studied in the laboratory.

In this contribution we will present first results of recent measurements and report on experiments planned in the near future.

* This work is supported by the DFG (ZI 510/5-1).

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